

4 p. m. of the same day, a violent wind and rain storm occurred at Dexter; no damage was reported.

New Jersey: Freehold, 8th. A severe storm occurred during the evening. No damage was done in the town, but in the adjacent townships, several barns and other buildings were damaged. The path of the storm was from southwest to northeast. A storm, accompanied by thunder and lightning occurred at Long Branch at 4 p. m. of the 7th. No serious damage was reported.

Ohio: A severe storm, accompanied by hail, occurred in Huron county on the 8th; growing crops were cut down and many gardens were ruined. Reports from several sections in northern Ohio state that the storm was very severe and caused considerable damage to crops and other property.

Pennsylvania: A severe wind and rain storm visited the Cumberland valley on the night of the 6th. Much damage was done by floods. (see Floods).

Rhode Island: A tornado occurred near Olneyville, Johnson county, on the 24th. One barn was unroofed and several dwellings were more or less damaged; many large trees were uprooted.

Wisconsin: Milwaukee, 3d. A severe thunder-storm occurred on the morning of the 3d, and was accompanied by heavy rainfall, causing much damage by floods (see Floods). Several buildings were struck and damaged by lightning during the storm. A storm also occurred on the 7th, which caused some damage outside of the city; many trees being blown down. Madison 15th, a violent storm, accompanied by heavy rain, thunder and lightning, occurred during the evening of the 14th, and continued until the morning of the 15th. The storm was accompanied by hail, which caused great damage to crops. The water rose rapidly, flooding bottom-lands and sweeping away a railroad bridge.

VERIFICATIONS.

INDICATIONS.

The percentages of verifications of indications for the month of August will be published in the September number of the REVIEW.

CAUTIONARY SIGNALS.

Thirty-five cautionary signals were displayed during the month of August, of which eighteen, or 51.4 per cent, were justified by winds of twenty-five miles, at or within one hundred miles of the station. No off-shore signals were displayed during the month.

Seventy-five winds of twenty-five miles, or more, per hour, were reported, for which no signals were ordered; many of these were local storms or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the table on the right-hand of chart iii., are given the highest and lowest stages of water observed at Signal Service stations during the month of August 1882. In the first column of this table are given the heights of water on the gauge, which have been found dangerous to property. The water did not approach the danger line in any of the rivers during the month. The Mississippi reached its highest stage at Dubuque, Davenport, Keokuk, Vicksburg and New Orleans, on the 1st; at LaCrosse and Cairo on the 8th and 9th; at Memphis, on the 11th; and at Saint Paul on 27th and 28th. The Missouri, reached its highest stage, from the 1st to 3d. The Ohio, was highest at Pittsburg and Cincinnati, on the 29th, and Louisville on the 2d, 3d and 13th.

FLOODS.

The excessive rainfall in Kentucky, Ohio, Wisconsin, and in parts of Texas, has caused damaging floods in these sections of the country and has seriously checked harvesting operations. The following reports of the most destructive floods are given:

Arizona: Serious washouts occurred on the 24th along the Southern Pacific railroad between Casa Grande and Yuma.

Colorado: Heavy rains occurred in various sections of the state during the 3rd and 4th, causing damaging floods. At Black Hawk, Gilpin, county, a land-slide, caused by the heavy rain, destroyed two houses and damaged a large portion of the Colorado Central railroad track. The Purgatoire river overflowed its banks and inundated the entire valley; several farm houses were swept away and crops entirely ruined. An overflow at the Cache-La-Poudre river also destroyed a number of farms and about \$10,000 worth of crops. Serious washouts occurred on the Rio Grande railroad.

Indiana: Vevay, 1st. Heavy rains caused creeks to overflow damaging crops, bridges, and fences to the amount of \$10,000.

Kentucky: Millersburg, 1st. The heavy rains of July 31st, caused much damage at this place. Hundreds of acres of corn were damaged, potatoes were washed out, and haystacks swept away. The Bowen coal mine was inundated, the miners barely escaping with their lives. The loss of crops along the Licking river, between Falmouth and Livinggood, a distance of four miles, is estimated at \$30,000; in addition to this, much stock was drowned. The losses at other points along the river were equally heavy. Heavy rains fell in the northern and central parts of the state during the 3d, causing streams to rise above their banks and doing more or less injury to crops.

Michigan: Heavy rains fell in the various sections of the state from the 1st to 4th, causing more or less damage; bottom lands were flooded and considerable damage was done to standing wheat. Between Ionia and Grand Rapids, the floods were very severe and caused much loss of property.

Ohio: 1st. Heavy rains in central Kentucky caused a rapid rise in the Licking river, which resulted in great destruction of river craft and other property. Many houses and much farm property along the banks were destroyed, and large quantities of logs, trees, debris of houses and farm produce, with various other kinds of drift, were swept down by the current. At Cincinnati harbor, the river craft were seriously damaged, several steamers were driven from their moorings and were more or less injured; seven laden barges were sunk while many sustained great damage. The loss to river property was estimated at \$60,000. The Ohio river rose nineteen feet above low-water mark, the rise being wholly due to the flood in the Licking. At Maysville several cabins were washed away, and some of the inmates were drowned. In Richland county, heavy rains during the 3d and 4th, flooded the bottom lands and caused much damage to crops. In Perry county a flood occurred in the valley between Rendville and Corning; houses, barns and stock were carried away, and crops were completely ruined. Much damage was done to the track of the Ohio Central railroad; many bridges were undermined and all communication was cut off. In Stark county, many railroad bridges were swept away or undermined, and the tracks and road-beds of the various railroads sustained considerable damage, interrupting all travel. In Sandusky county the rain caused serious damage; acres of grain were flooded and much stock and fencing were carried away. Several railroad bridges were undermined and the tracks much damaged. At Millersburg, Holmes county, the water flooded the lowlands, doing great damage to crops. Railroad tracks were washed out and travel was delayed for several days. At Marietta, the Muskingum river rose rapidly during the night of the 3d and 4th, causing a gap of one hundred fifty feet in the dam. Nine coal-laden barges were lost. At Newcomers-town, Tuscarawas county, the rain of the 3d was of short duration only, but during its prevalence an immense volume of water fell. All streams rose rapidly; the water covered many acres of corn and meadow-land, sweeping away fences and destroying a quantity of hay; several houses were more or less damaged. At Orrville, Wayne county, the floods caused much damage to railroads, crops, and other property. The village of Fairview was inundated, many of the inhabitants being compelled to leave their homes. In Wood county the water caused immense damage to crops, especially to oats; the country between Bowling Green and Tontogany was com-

pletely inundated. At Shelby, on the 7th, a heavy rain flooded a tract of country about two miles wide, causing great injury to crops. On the 23d a very heavy rain occurred at Dayton; streets and cellars were flooded, and travel was delayed owing to washouts on the railroads.

Pennsylvania: Heavy rains occurred in the Cumberland valley on the 6th. The town of Chambersburg was inundated and great damage to property occurred; creeks overflowed and caused much injury to growing crops, and several washouts occurred on the railroads. Heavy rains occurred in Lancaster county on the 7th; at Refton, the Beaver creek rose twelve feet in an hour, washing away a bridge and destroying one hundred feet of railroad track. The tobacco crop suffered severely.

Texas: Heavy rains occurred in San Saba county on the 4th; streams were swollen, and the corn and oat crops were damaged by the continuous rain. A heavy rain storm began at 8:30 p. m. of the 23d at Concho, and continued in torrents until the morning of the 24th, the total amount of precipitation being 6.86 inches. On the morning of the 24th, the South Concho river was thirty feet above its level and rising with great rapidity, reaching its highest point at about 4 00 p. m. of that day, when it was reported to have been forty-five feet above its ordinary level. Houses were swept away, and the inmates were drowned in the rapid current; many persons sought safety by clinging to the tops of the strongest trees, but these, in many cases, were washed away, and the occupants drowned. The town of Ben Fiehl was completely washed away, only the court-house and jail being left standing, in the former of which the water remained to a depth of several feet. The town of San Angelos was also inundated; the telegraph line was covered with water, and all communication was cut off. The river was one mile wide in many places, and large numbers of cattle and horses were washed away. It is estimated that fifty persons were drowned in this flood, and that from 10,000 to 15,000 horses, cattle, and sheep were lost. The damage to property amounted to more than \$150,000. In Erath county, the Bosque river overflowed, destroying property to the amount of \$50,000. One family was drowned, and others saved themselves by clinging on the roofs of their dwellings. Serious washouts occurred on the Texas Pacific railroad, interrupting communication between Dallas and Fort Worth.

Virginia: Variety Mills, Nelson county, 4th. A heavy rain storm occurred about ten miles north of station; the creeks rose rapidly, and much damage was done to fencing and to the corn and tobacco crops.

Wisconsin: Milwaukee, 3d. The heavy rain of the 3d was very destructive; the streets were flooded, and large quantities of merchandise stored in cellars and basements, was completely ruined. Much damage was done to streets and sewers. Outside of the city the losses were very serious. Wheat, corn and oats were badly damaged, and several barns were undermined. The damage to the city amounted to between \$50,000 and \$100,000. In Sheboygan, Wausheka, and Jefferson counties the rain caused much damage to crops, especially in the first-mentioned county.

Madison, 14th. The heavy rain that accompanied the storm of the 14th caused slight damage to railroads and other property; but the principal damage to crops appears to have been caused by the heavy and destructive hail which fell during the storm. The country near Cross Plains was flooded, causing some damage to railroad bridges.

HIGH TIDES.

Coney Island, New York, 28th. The high easterly wind which prevailed during the 27th and 28th, caused very high tides and rough sea. The marine railroad between Manhattan and Brighton was damaged by the waves.

TEMPERATURE OF WATER.

The temperature of the water as observed in rivers and harbors at the Signal Service stations, with the average depth at which observations were taken, is given in the table on the

right hand of chart number ii. In the first column of the table is given the maximum temperature observed during the month; and in the second column the minimum temperature observed during the same period.

The following table gives the highest and lowest temperatures of water at the several stations, with the range of water temperature, mean temperature of the air at the station, and the depth of water at which the observations were taken. The greatest ranges occurred as follows: 20° at Galveston; 18°2 at Cleveland; 17° at Duluth. The smallest are: 2°8 at Port Eads; 3° at Marquette; 3°7 at Block Island; 3°5 at Eastport; 3°8 at Portland, Oregon, and 4° at Baltimore.

Temperature of Water for August, 1882.

STATION.	Temperature at bottom.		Range.	Average depth feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City.....	78.6	69.0	7.6	6 9	72.6
Alpena.....	72.8	64.1	8.7	12 0	65.4
Augusta.....	80.5	74.0	12.5	7 7	79.3
Baltimore.....	80.0	76.0	4.0	10 0	73.9
Block Island.....	68.8	65.1	3.7	8 2	70.2
Boston.....	67.5	60.0	7.5	25 0	69.9
Buffalo.....	73.8	69.8	6.0	10 2	68.9
Burlington.....	79.0	69.0	10.0	18 0	69.5
Cedar Keys.....	87.0	81.0	6.0	10 3	81.4
Charleston.....	86.6	79.4	7.2	40 7	81.7
Chicago.....	74.5	68.4	6.1	8 2	71.2
Chincoteague.....	84.0	70.0	14.0	6 0	74.1
Cleveland.....	78.7	58.5	18.2	14 0	69.9
Detroit.....	73.0	70.0	3.0	24 4	71.3
Duluth.....	69.0	52.0	17.0	15 9	63.6
Eastport.....	49.5	45.7	3.8	17 1	61.7
Escazaba.....	70.0	58.0	12.0	15 0	64.6
Galveston.....	87.0	67.0	20.0	14 9	81.4
Grand Haven.....	73.8	65.3	8.5	19 0	68.8
Indianola.....	87.4	81.0	6.4	9 4	81.4
Jacksonville.....	89.0	83.0	6.0	18 0	81.6
Key West.....	90.0	77.0	13.0	16 4	84.6
* Mackinaw City.....	68.8	63.3	5.5	13 0	66.3
Marquette.....	61.8	58.8	3.0	10 6	62.4
Milwaukee.....	72.5	65.0	7.5	8 0	68.3
Mobile.....	84.6	79.5	5.0	15 6	79.4
New Haven.....	81.3	70.2	11.1	15 6	69.7
New London.....	72.0	66.0	6.0	12 10	70.4
Newport.....	72.2	65.5	6.7	10 11	70.2
New York.....	77.0	71.0	6.0	21 9	71.7
Norfolk.....	84.0	78.0	6.0	17 3	77.3
Pensacola.....	85.1	79.1	6.0	18 0	78.8
Portland, Me.....	63.0	56.9	7.0	19 2	69.7
Portland, Oreg.....	70.2	66.4	3.8	68 1	64.6
Port Eads.....	82.8	80.0	2.8	9 5	80.6
Provincetown.....	74.0	67.0	7.0	14 0	69.9
Punta Rassa.....	91.6	84.5	7.1	11 11	80.8
Sandusky.....	77.6	69.7	7.9	10 0	71.1
Sandy Hook.....	74.3	69.8	4.5	1 9	73.3
San Francisco.....	62.0	57.5	4.5	31 7	57.6
Savannah.....	84.9	81.3	3.6	12 10	81.7
Smithville.....	86.0	80.0	6.0	10 0	79.4
Toledo.....	78.5	69.5	9.0	11 11	72.1
Wilmington.....	83.0	78.0	5.0	13 0	79.6

*Observations from 26th to 31st, inclusive.

ATMOSPHERIC ELECTRICITY.

AUROSAS.

The most remarkable and widely observed display of the month occurred on the evening of the 4th, and may be classed as one of the most brilliant and extensive displays of the year. It was observed throughout the northern part of the United States, from Maine to Oregon, and as far southward as northern Florida along the Atlantic coast. In the interior of the country, the most southerly stations at which the display was observed were, Louisville, Kentucky, and Wellington, Kansas.

The following are some of the most noteworthy descriptions of the display:

Portland, Maine: Brilliant auroral display from 9:10 to 10:30 p. m., consisting of diffuse white light with rose colored streamers and merry-dancers extending from the northern horizon to the zenith.

Mount Washington, New Hampshire: The display began at 9:05 p. m. Two arches appeared at 9:10 p. m., and at 9:30 an almost complete corona was formed. Waves of whitish light flashed continually from the horizon to the zenith with great rapidity. Near the horizon, the light was of a greenish color. The brilliancy of the display was very variable, and was greatly lessened by the rising moon at 10:00 p. m., and ended during the early morning of the 5th.